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From: Teodor J. Holmberg
Pages: 8 (including this page)Date: February 28, 2005
Our File: 5089-2PUS/CIP

Please deliver to:

Recipient: Examiner NASSER, Robert L ART UNIT 3736	Company: U.S. Patent & Trademark Office	Fax No.: 703-872-9302
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Notes/Comments:

SUBMISSION
IN
U.S. PAT. APP. SER. NO. 09/711,462

Contents: 7 pages of documentation

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MDE MEDIZINTECHNIK GmbH

Used test equipment for the measurement:

1. Supply pulse-generator (MDE) operated by a single chip microprocessor P87C51 and with powersupply from Ulveco. The frequency, Pulselength, Pulsetrain and Amplitude could be adjusted.

Connected treatment-heads: 1 Diode-cascade (CH 363 503) / Radiation pictures per email.

2. IR diode type: LT4B83-81-940 / IR Diodes supplied Hemar, Manuf. By LedTech in Taiwan.

3. Settings: Repetition frequency of 9.9 Khz / Pulsewidth: 20 usec. / Amplitude of 24 Volt. Diode coupling like schematic.

4. Output: Spectral schematics enclosed

5. Wavelength peaks: 686 nm, 942 nm, 1187 nm.

6. Measurement Lab. : University in Saarbrücken – Germany, Dept. of Biology, Dr. U. Warnke.

7. Lab. Device from Instrument Systems, München – SP 320D connected with Photomultiplier, receiver opening Ø 3,5 mm, Measurement distance approximately 5 mm.

8. Time: 24.09.1991

MDE Medizintechnik GmbH . P. Fach 400 . CH-8201 Schaffhausen . Fax +41-52-6431192/ email: swissmed@dplanet.ch



Ref.: Photodynamic Simulation device (CPLP 5089-2PUS/CIP)

Normally Semiconductor diodes (LED / Light emitting diodes) is produced for continous radiation like a pocket lamp with battery (White LED).

Normally Data depending of type / manufacturer.

Recommended supply applications:

Supply Voltage: 2,5 – 4 Volt
Current / mA DC: 20 – 100 mA

The inventors method to supply the diodes:

Supply Voltage: 15 - 24 / 24 – 75 Volt
Pulsed supply: 5 - 20 usec. / 2 – 200 nsec. pulselength
Pulse repetition: 1 – 10 Khz

In fact the diodes is supplied similar to modern Laser diodes, where there is used fast drivers producing sharp and clear supply pulses. A monitor (Textronix) is used to control the current pulses.

A normal continous supply of the diodes would lead to production of light with one wavelength of f. examp 940 nm. Since these diodes are not producing a monochromatic light it is normal to find specification with Wavelength: 940 nm +/- 50 nm.

Using the demonstrated pulsed laser driving mode the diode starts to oscilate and produce light of 2 wavelengths next to the main wavelength of 940 nm.

Hereby overheating of the diodes is avoided and a better lifetime (about 10 years is proved) is achieved, combined with excellent therapy results.

It is not expected that every standard diode can be used for the above demonstrated driving method, but we have found 2-3 various brands and a special quality assorted type works excellent.

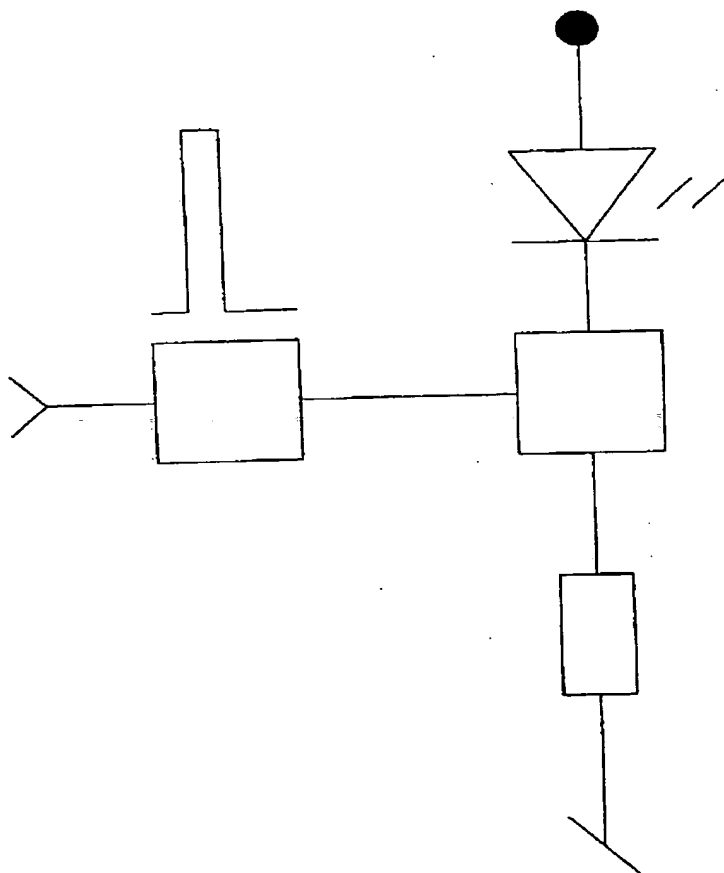
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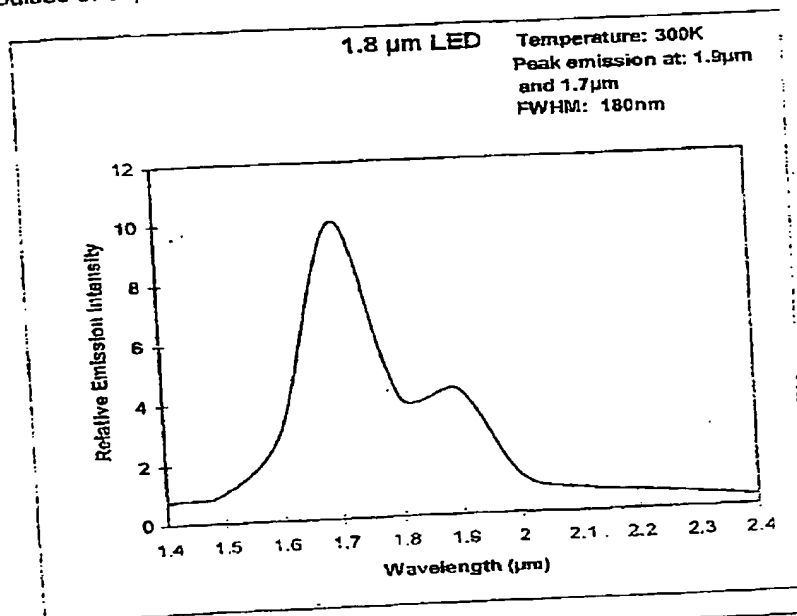

LED18-10

Light Emitting Diode

Parameter	Rating	units	Conditions
Peak emission wavelength	1.8	μm	300K
Spectral bandwidth (FWHM)	0.36	μm	300K
Radiant output power (@300mA):	90	μW	2.5% duty cycle
Operating Currents	100-200	mA	pulsed*
	0.8-1.0	A	(peak current)**
Rise time	100	nS	
Temperature drift of band	2	nm/K	
Encapsulation	TO-18 (TO-5 opt.)		Lens / Window
Mesa diameter	1	mm	
Field of View	60	deg.	

Notes

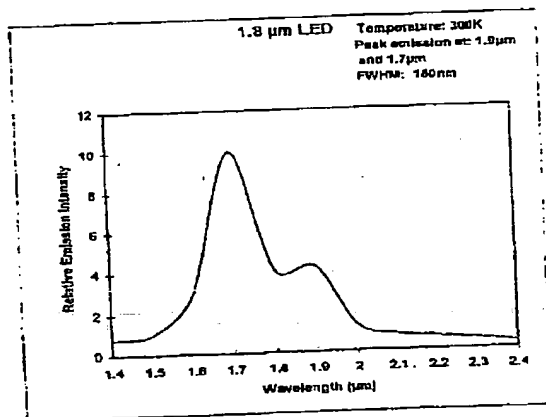
- recommended detector is room temperature photovoltaic MCT detector model PDI-4 or TE-cooled photovoltaic MCT model PDI-2TE-4; or room temperature photoconductive MCT detector PCI-4 or TE-cooled photoconductive detector model PCI-2TE-4
- DO NOT connect/disconnect the LED while the pulse generator is in operation
- the lead nearest to the tag of TO-header is the anode and marked with a red dot.
- the cathode is connected to the case
- * square pulses of 500 μsec duration and 1 KHz repetition frequency
- ** square pulses of 50 μsec duration and 500 Hz repetition frequency



Boston Electronics Corporation, 91 Boylston Street, Brookline MA 02445
(800)347-5445 or (617)566-3821 * fax (617)731-0935 * boselec@boselec.com * www.boselec.com

References: Photodynamic Simulation device (CPLP 5089-2PUS/CIP)

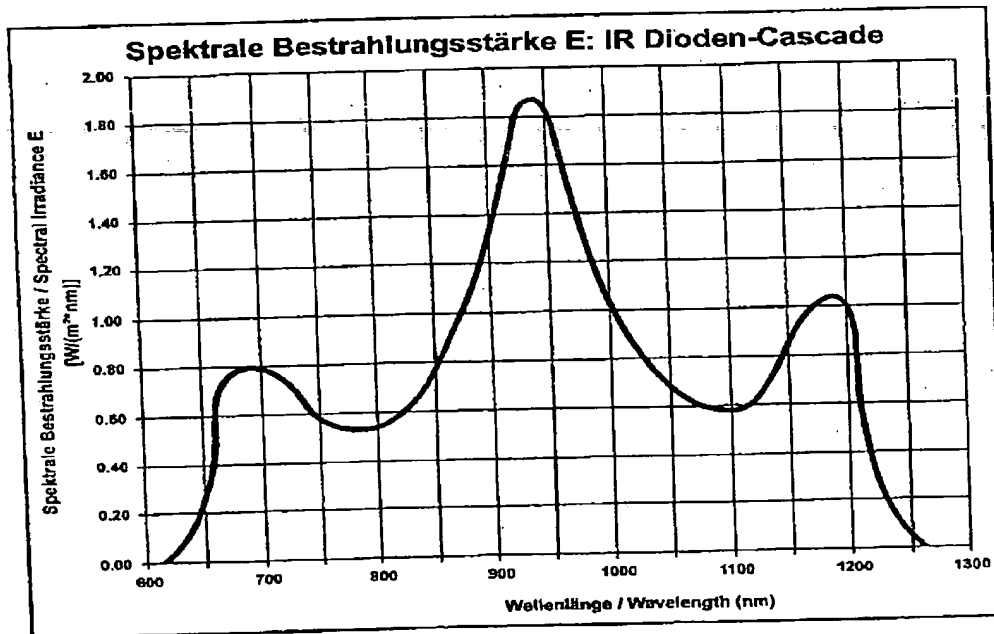
Data sheet: Boston Electronics Corporation, 91 Boylston Street, Brookline MA02445
Component: IR Light Emitting Diode (LED 18-10)
Op. Currents: 100-200 mA
Wavelength: Infrared 1.7 μm and 1.9 μm
Op. Mode: Pulsed operation - 1 KHz / 500 usec.



Lecture at Laser Congress in Munich (1997) by Prof. D. Fluck University Zürich, ETH, Institute of Quantum electronics.

Stable 45 mW blue laser by frequency doubling.

Direct second-harmonic and sum frequency generation (SHG, SFG) with near infrared semiconductor laser diodes offers the possibility of robust, compact and reliable blue lasers. Efficient blue light generation at 430 nm and 490 nm by noncritical PM SHG with LD has been demonstrated for single pass, resonant and waveguide configurations. Other wavelengths in the 415 to 475 nm spectral range can be efficiently generated by making use of SFG with commercial available single-mode AlGaInP, AlGaAs and InGaAs laser diodes.



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Image of hand before radiation



Image of hand after 30 seconds
radiation with IR Diode-Cascade